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Comparison of O_3 and H_2O Profiles by Ground-based Microwave Radiometry with Aura/MLS

Klemens Hocke, Alexander Haefele,
Niklaus Kämpfer (IAP, University Bern, CH)
Dominique Ruffieux (MeteoSwiss, Payerne, CH)
Lucien Froidevaux (JPL, Pasadena, USA)
Hugh Pumphrey (University Edinburgh, UK)

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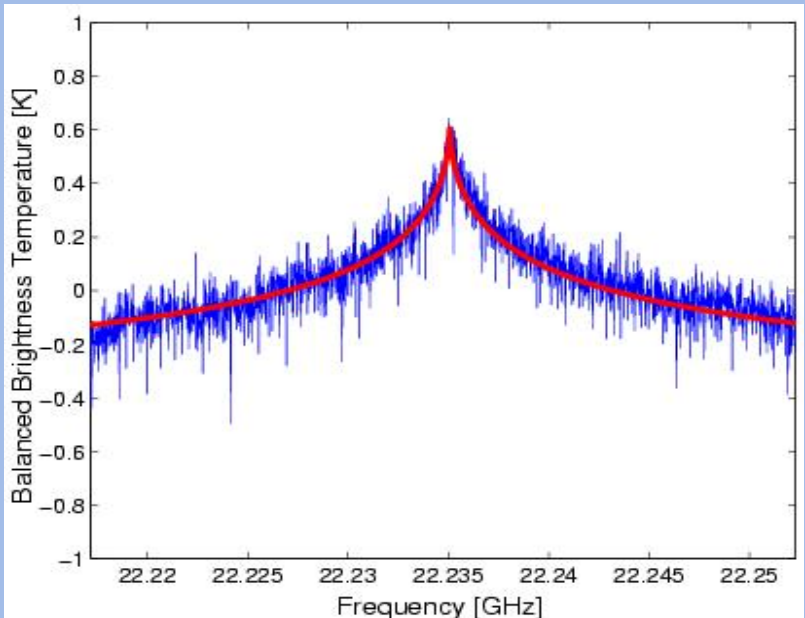
Overview

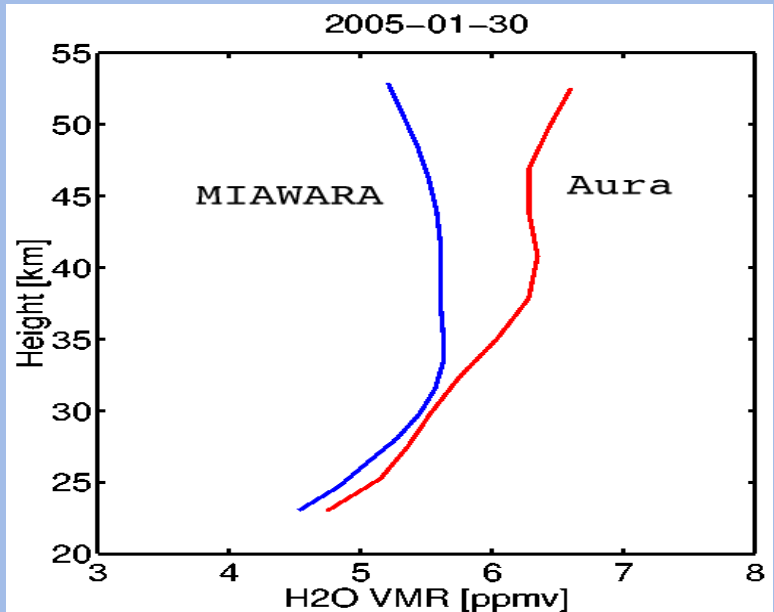
1) Comparison of H_2O profiles of MIAWARA radiometer at Bern and Aura/MLS
2) Comparison of O_3 profiles of SOMORA radiometer, ozonesonde at Payerne, and Aura/MLS
3) Conclusions

MIAWARA radiometer

- 22.235 GHz emission of H_2O
- Broadband AOS and narrowband chirp transform spectrometer
- Retrieval of H_2O volume mixing ratio with ARTS and Qpack software
- Altitude range 20-80 km
- New NDSC instrument, operated by IAP, Uni Bern since April 2002

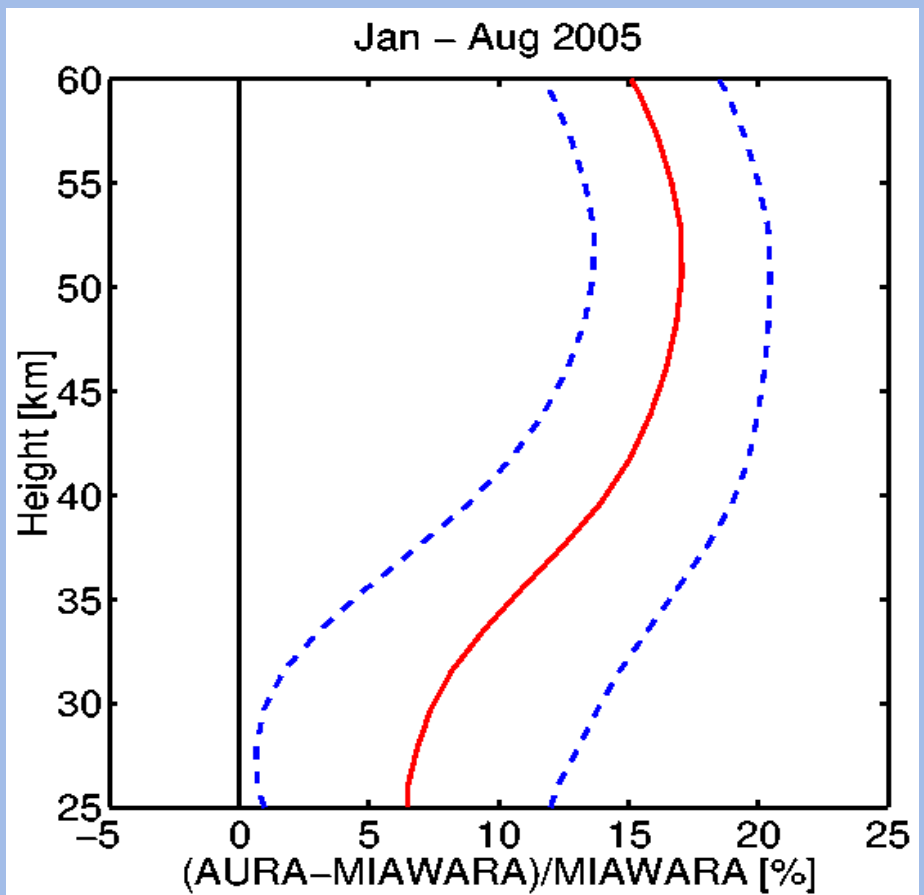
H_2O spectral line at 22.235 GHz and H_2O volume mixing ratio profile





- Spectral resolution: 14 kHz at line center, measured by a narrowband chirp transform spectrometer
- Inversion of spectral line into an H_2O profile by Rodger's optimal estimation method (blue line, right-hand-side)

Aura/MLS versus MIAWARA H_2O profiles



- Comparing Aura profiles to daily profiles of MIAWARA
- Collocation: horizontal distance < 800 km
- Averaging kernel smoothing is applied to Aura profiles
- 875 profile pairs are found for Jan, Feb, Mar, Jul, Aug 2005
- Bias around 12 % (red line)
- standard deviation 3-5 % (blue lines)

SOMORA ozone microwave radiometer

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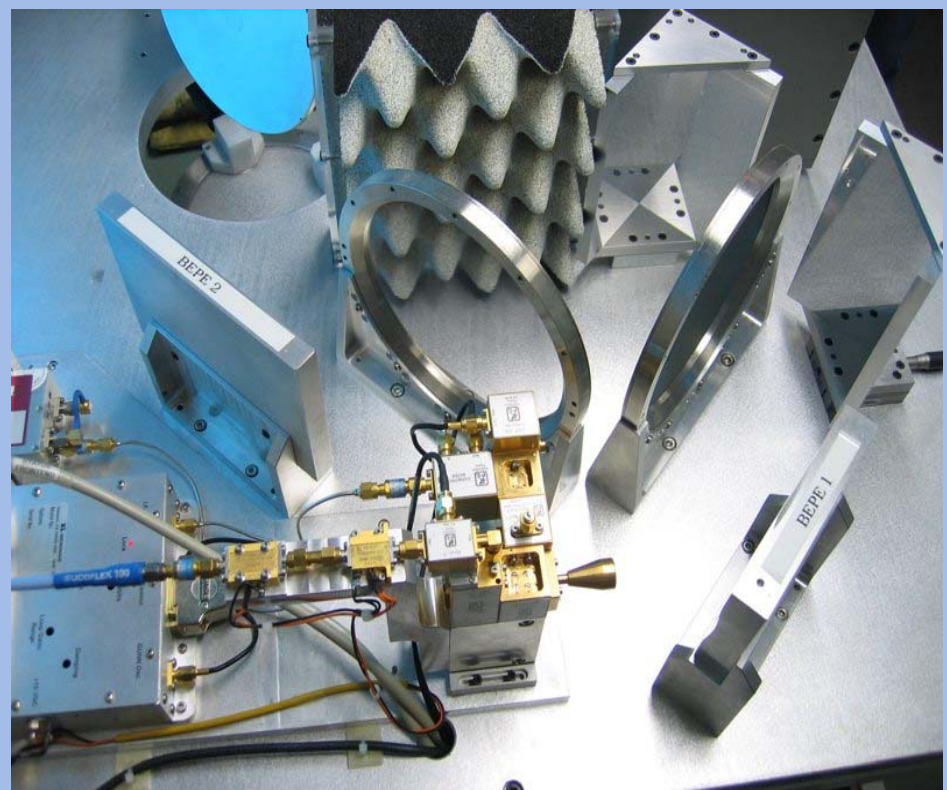
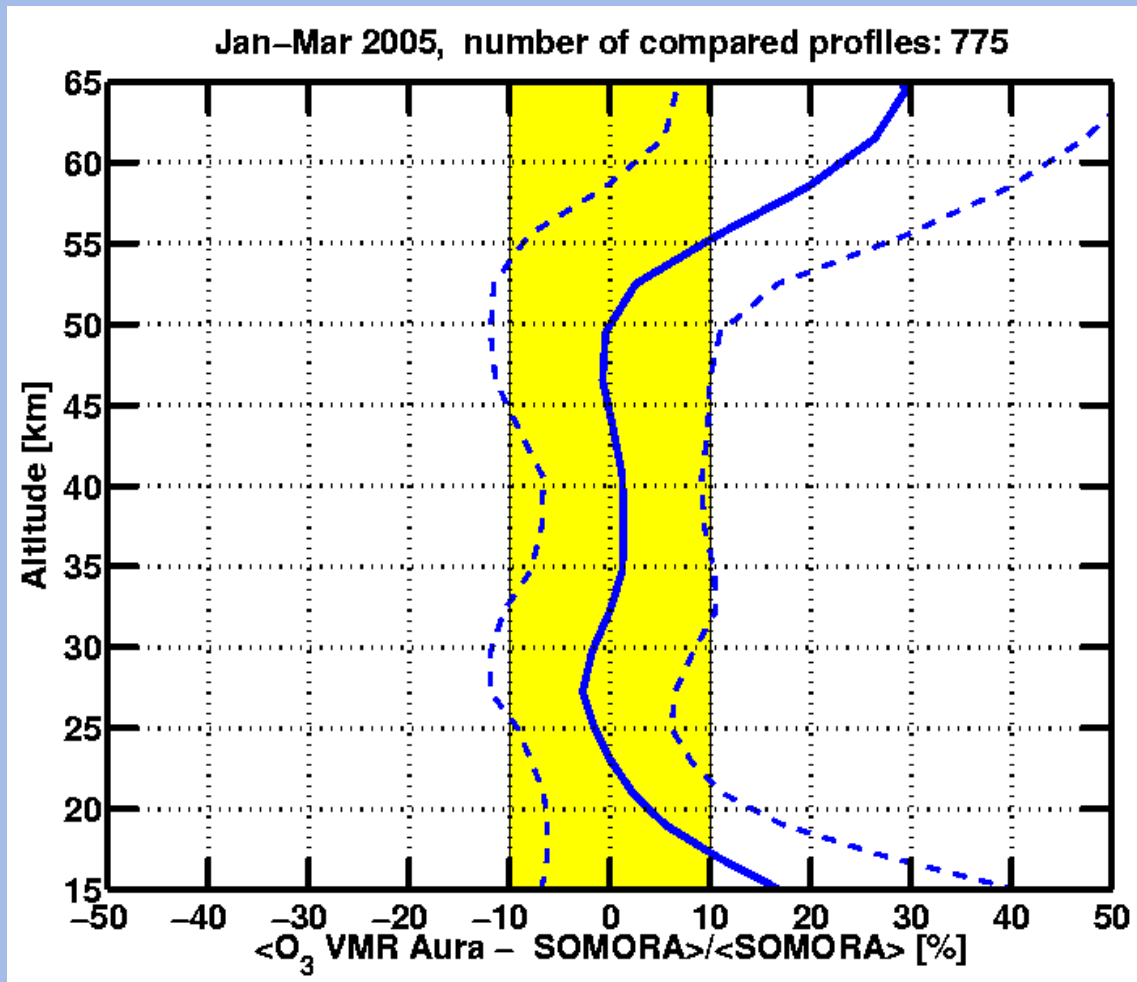
- Measurement of 142 GHz thermal emission of ozone
- Continuously operated at Payerne (46.82N, 6.95E) by MeteoSwiss
- Instrument design, construction, and software by IAP/University of Bern
- **NDSC** instrument



Comparison of Ozone VMR of Aura-MLS and SOMORA

- Horizontal distance: d < 800 km
- Time window: +/- 1 hour
- Averaging kernel smoothing is applied
- No bias at h=25-50 km
- 775 profile pairs within 10%, January - March, 2005



Comparison of fine structure:
Payerne Ozonesonde and Aura/MLS

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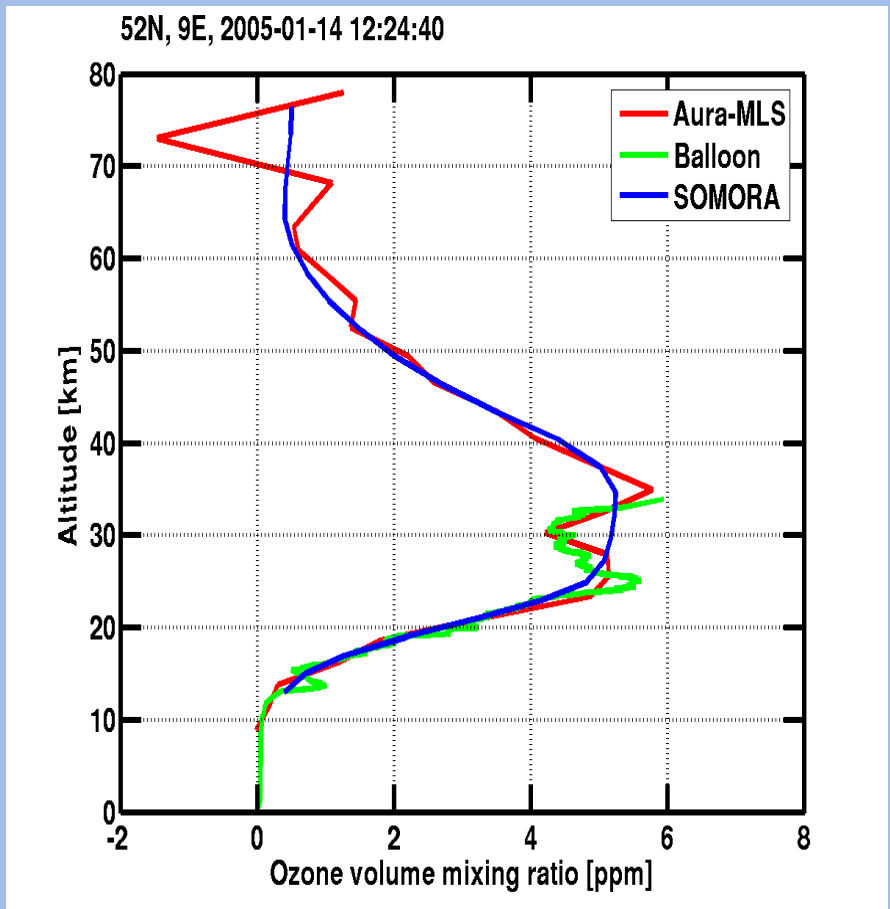

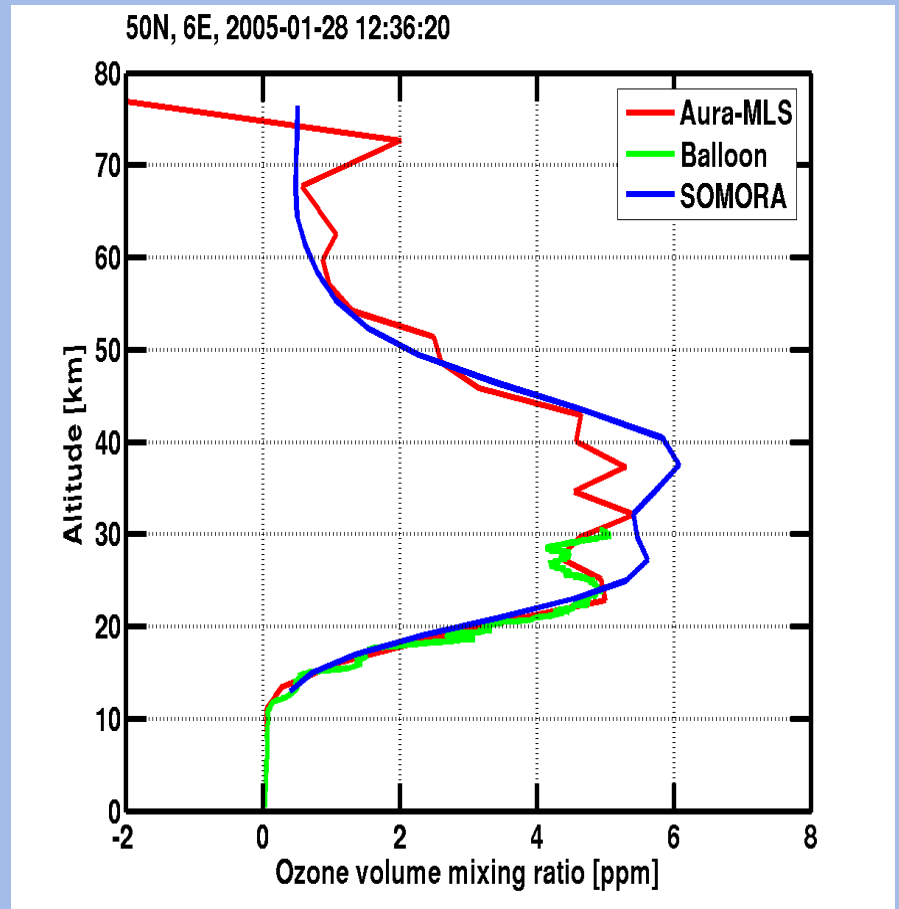

Conclusions

Ozone:

- Aura and SOMORA are within 10 % in January-March 2005
- No bias at h=25-50 km
- Fine structure of Aura profiles is often confirmed by ozonesonde in Payerne

Water vapor:

- Deviation of Aura and MIAWARA is around 12 % for a total of 875 profile pairs
- Standard deviation is 3-5 %
- Deviation of HALOE and MIAWARA was around 5 % (Deuber et al., 2005)